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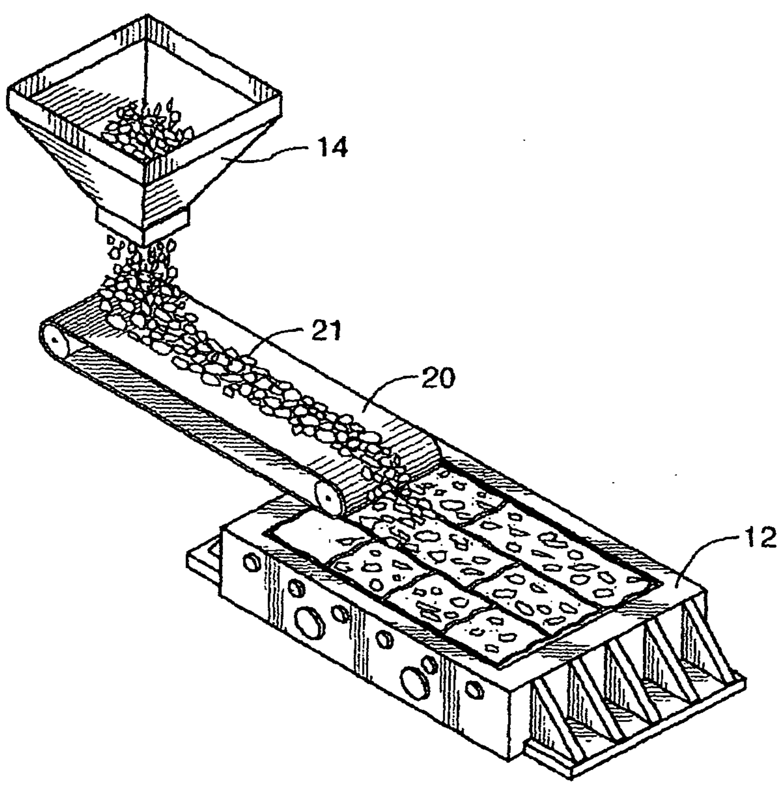
(54) Title: METHOD AND APPARATUS FOR CREATING CONCRETE BLOCKS WITH THE APPEARANCE OF NATURAL FOSSIL STONE



(57) Abstract: A generally conventional concrete block is cast using known procedures. After pouring concrete in a mould, or otherwise forming a block, and before the surface of the concrete has set, shaped bodies of ice are randomly placed on the surface or surfaces to be treated and pressed into the surface(s) to desired depths. The ice bodies will melt during curing of the concrete, but not before the concrete has set enough to keep the shape of the indentations made by the ice bodies. Thus, when the concrete block has set completely, there remains a textured surface having a structure similar to that of natural fossil stone. Alternatively, shaped bodies of combustible material are randomly placed on the surface or surfaces to be treated and pressed into the surface(s) to desired depths. The combustible bodies will make the concrete keep the shape of the indentations made by the bodies after the concrete has cured. After curing, the combustible bodies are heated to their combustion temperature and burned away from the concrete surface. Thus, when the bodies have been removed, there remains a textured surface having a structure similar to that of natural fossil stone.

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METHOD AND APPARATUS FOR CREATING CONCRETE BLOCKS WITH THE APPEARANCE OF NATURAL FOSSIL STONE

TECHNICAL FIELD

The present invention generally relates to the production of artificial stone, such stone having a surface with randomly dispersed holes making the artificial stone look like a natural fossil rock. More specifically, the present invention relates to a method and an apparatus for producing concrete blocks with the mentioned properties.

BACKGROUND ART

The manufacture of concrete or concrete blocks is a well-known conventional process. However, concrete blocks are generally not very appealing visually, except for decorative architectural blocks.

Traditionally, imprinting textures onto concrete blocks have been accomplished by using compression head stripping shoes with reliefs and textures formed on the surface, which contacts the concrete block. Thus, as the shoes press down into the concrete, any reliefs or textures are transmitted to the concrete block surface. The resulting concrete block is identical to other concrete blocks manufactured with this method, no randomness will be apparent, making a wall off stones appear artificial instead of natural.

DISCLOSURE OF INVENTION

It is therefore an object of the invention to provide a method of producing an artificial concrete stone having randomly dispersed holes arranged on at least one surface thereof.

The inventor recognized that there was a need for artificial stone, for load-bearing masonry or non load-bearing masonry, in predetermined sizing and configurations, for ease of assembly and application. The inventor further recognized there was a need for a manufactured stone which could be produced in quantity and at a reasonable cost, via a process similar to

conventional concrete block manufacture, but with additional steps to produce a fossil-like appearance on one or more sides of the artificial stone. The invention thus expands the horizons for texture and character into realms not available or obtainable with standard and decorative architectural block profiles.

The artificial stone product is created by either filling a mould with a typical concrete block aggregate mix or extruding a block using an extrusion machine. The created concrete block, stone or slab is then processed in one of two preferred embodiments further described below. The moulds or extrusion dies used can be varied greatly, creating a broad spectrum of concrete blocks which can be manufactured using a method and apparatus according to the invention. Several blocks can be manufactured simultaneously, by using a multi-compartment mould.

In a first embodiment of the invention, a generally conventional concrete block is provided and frozen water bodies (ice), or bodies manufactured from other easily melted materials such as wax, to form indentations in the non-set concrete. After pouring concrete in a mould, or otherwise forming a block, and before the concrete has set, shaped bodies of ice are randomly placed on the surface or surfaces to be treated and pressed into the surface(s) to desired depths. The ice bodies will melt during curing of the concrete, but not before the concrete has set enough to keep the shape of the indentations made by the ice bodies. Thus, when the concrete block has set completely, there remains a textured surface having a structure similar to that of natural fossil stone.

In a second embodiment of the invention, a generally conventional concrete block is cast using combustible bodies to form indentations in the non-set concrete. After pouring concrete in a mould, or otherwise forming a block, and before the concrete has set, shaped combustible bodies of, for example wood, Styrofoam (reg. Trade mark), saw dust, leaves, cardboard, paper, rubber, plastic and hemp etc. are randomly placed on the surface or surfaces to be treated and pressed into the surface(s) to desired depths. The combustible bodies will be burned away after curing of the concrete, making the concrete set to keep the shape of the indentations made by the combustible bodies. Thus, when the concrete block has set completely, there remains a textured surface having a structure similar to that of natural fossil stone.

Other aspects and features of the present invention will become apparent to those ordinarily skilled in the art upon review of the following description of specific embodiments of the invention in conjunction with the accompanying figures.

BRIEF DESCRIPTION OF DRAWINGS

Embodiments of the present invention will now be described, by way of example only, with reference to the attached Figures, wherein:

Fig. 1A is a plan side view of an apparatus for manufacturing concrete blocks according to the invention;

Fig. 1B is a plan end view of the apparatus of Fig. 1A;

Fig. 1C is a flow chart showing the concrete preparation for feeding into the apparatus of Figs. 1A and 1B;

Fig. 1D is a flow chart showing combustion of formed bodies according to the invention;

Fig. 2 is a perspective view of one embodiment of a mould used in the apparatus according to the invention;

Fig. 3 is a perspective view of one embodiment of a compression means used in the apparatus according to the invention;

Fig. 4 is a plan side view of a first embodiment of a means for spreading formed bodies onto a surface of concrete blocks used in the apparatus according to the invention;

Fig. 5 is a perspective view of a mould as shown in Fig. 2 when it has been filled with a concrete mixture;

Fig. 6 is a perspective view of a first embodiment of a spreading means according to the invention, showing the placing of combustible formed bodies on top of a mould filled with concrete mixture;

Fig. 7A is a perspective view of a second embodiment of a spreading means according to the invention, showing the placing of bodies on top of a mould filled with concrete mixture;

Fig. 7B is a plan side view of the second embodiment of a spreading means according to the invention, showing the placing of bodies on top of a mould filled with concrete mixture;

Fig. 8A is a perspective view of a third embodiment of a spreading means according to the invention, showing the placing of bodies on top of a mould filled with concrete mixture.

Fig. 8B is a plan side view of the third embodiment of a spreading means according to the invention, showing the placing of bodies on top of a mould filled with concrete mixture;

Fig. 9 is a perspective view of the pressing means of Fig. 3, shown when used in the apparatus according to the invention for pressing formed bodies into the surface of the concrete mixture in the mould;

Fig. 10A is a plan side view of the mould as shown in Fig. 7A and 8A, showing the mould after the bodies have been pressed into the concrete surface;

Fig. 10B is a plan side view of the mould as shown in Fig. 7B and 8B, showing the concrete blocks removed from the mould after pressing;

Fig. 11A is a perspective view of the concrete blocks from the mould as shown in Fig. 7A and 8A removed from the mould and ready for further processing;

Fig. 11B is a plan top view of the concrete blocks from the mould as shown in Fig. 7B and 8B;

Fig. 12A is a plan side view of a flame chamber for use in an apparatus according to the invention;

Fig. 12B is a detail view of a concrete block having combustible bodies pressed into its surface;

Fig. 12C is a detail view of a concrete block having combustible bodies burned away leaving voids in its surface; and

Fig. 12D is a perspective view of the flame chamber of Fig. 12A.

BEST MODE FOR CARRYING OUT THE INVENTION

The manufacture of concrete takes many forms, but the basis is to introduce powdered cement, by a volume of 10 to 20 percent, to an aggregate of sand, limestone and water. The size and gradation of the aggregate can vary greatly depending on the process, but the end result desired is to have the cement bind the aggregate together through the process of hydration to achieve a solid state. Color pigments, plasticizers, water repellents, accelerators/retarders may also be added to customise the cast concrete properties. The concrete can be in a semi-liquid state, for instance like Redi-Mix™ Concrete, which requires a form or mould to contain and shape the concrete until it is hard. Dry concrete, called "zero slump" can be used in the process, utilizing a single mould box, which is used over and over again to form the concrete blocks. The dry product is formed in the mould up to ten cycles per minute. The thus formed product remains stable in size and shape after release from the mould until final cure. Curing can take place by usual means, without introduction of steam and heat to accelerate curing when using Redi-Mix, or inside chambers using steam and heat when using "zero slump" concrete to accelerate the curing process. Fig. 1A shows one embodiment of a casting machine **1** according to the invention. A hopper **14** of the machine is fed from a mixing station **10**, which is shown in schematic form in Fig. 1C. The casting machine 1 further has a mold **12** and a compression head **13**. The aggregate mix contained in

the hopper is discharged to a feed-box **15**. The feed-box carries a proportioned amount of aggregate over the mold **12**, the mold being arranged lower than the feed-box at this time. A pallet **16** is held tightly against the cavities in the mold and the compression head is held away from the mold, to allow the feed-box unrestricted access to the mold, for depositing aggregate into the cavities of the mold.

Installed on the front of the feed-box is a cut-off bar **17**, that strikes off and levels the aggregate in the mold prior to compaction by the compression head. Also mounted on the top of the cut-off bar is a bristle sweeper bar **18**, that cleans off the stripper shoes on the compression head. This occurs as the cut-off bar **17** passes back and forth under the compression head while aggregate fills the cavities **12'** of the mold. After the cut-off bar **17** has returned to it's home position under the hopper **14**, the compression head **13** is lowered into the aggregate in the cavities of the mold **12**. The compression head has plates **13'** mounted to it having the same general shape as the cavities in the mold, and the plates compress the aggregate in the mold to specified densities. These plates are called stripper shoes, and are traditionally available in an extensive range of patterns for stamping their pattern onto the aggregate in the mold (this is not the case in the present invention).

During this process the compression head **13** and the mold **12** receive intense vibration to consolidate the aggregate in the mold cavities, and assist with compaction of the concrete block unit being made.

To cast the concrete block according to the invention, a preferred mix of crushed limestone and manufactured sand is used. Two additives are optionally introduced to obtain plasticity and water repellence, and colour is introduced into the aggregates to reproduce the colours of natural stone. Water and concrete are added to complete a typical preferred mix as follows:

2,000 lb.	Manufactured concrete sand
2,000 lb.	Crushed limestone screenings
50 oz.	Water repellent additive
400 lb.	Cement powder
16 oz.	Plasticizer
14 lb.	Iron oxide color pigment
Water	To required volume

The products are blended to form a zero-slump concrete mix that is introduced into moulds of various sizes and shapes for the initial product. The typical sizes are defined by widths of 10 cm (4"), 15 cm. (6"), 20 cm. (8"), 25 cm. (10") and 30 cm. (12"), in varying lengths and thicknesses. The products are advantageously manufactured in special configurations to allow solid material for fracturing in random lengths. The product is promptly removed from the moulds and is then fully cured in chambers with live steam, heat and 100% humidity. These factors achieve concrete hydration and binding of the material. This process is typical for conventional manufacturing of concrete blocks and their curing process.

According to a first embodiment of the invention, to form the desired impressions in the concrete surface, formed bodies of ice, or other meltable material (i.e. material that melts at temperatures around room temperature, 20 deg. Celsius), are pressed into the surface and left there when the block is moved to a curing facility. During curing, the ice bodies will melt, leaving the desired impression in the concrete surface. The surface may be on a horizontal or a vertical plane of the finished concrete block in its application, as desired, or on more than one surface, for instance for corner applications. By controlling the sizes, shapes and quantity of ice bodies applied to the concrete surface, it is possible to achieve a natural fossil stone look of the treated surface having a "random" dispersement of different size and shape indentations. The ice bodies are preferably hard frozen, i.e. have a temperature well below the freezing point of water, to prolong the period of time they stay hard when pressed into the soft concrete surface. The supply of appropriate formed ice bodies may be critical for an automated manufacturing plant, thus a fast-freezing mass production of ice bodies may be necessary. To achieve a natural looking artificial fossil stone, the ice body shape/size mix and quantity must be established.

The application of the ice bodies may be manual or automatic. Manual application can be anything from placing and pressing each ice body separately on and into the concrete surface, to spreading out the ice body contents of a container onto the concrete surface and pressing all bodies down using a manual or automatic press. Automatic application is preferably performed similar to the last described manual application, but preferably using an automatic press only. For instance, concrete slabs coming from an automatic concrete extrusion machine may be held in a mould box, or equivalent structure, and have one or more surfaces treated automatically or manually as per above. Alternatively, concrete blocks cast

individually may be manually or automatically treated with ice bodies whilst still in the mould.

The Fossil Stone appearance of the invention is created during this manufacturing process with the following functions. During the procedures noted above, and after the cut-off bar **17** has returned to it's home position under hopper **14**, but prior to the compression head **13** lowering onto the aggregate in the cavities of the mold **12**, ice bodies, for instance of sizes from .25 inch (6.35 mm) to 2.50 inches (63.5 mm) in diameter and from .50 inch (12.7 mm) to 4.00 inches (101.6 mm) in length, are dispensed over the aggregate in the mold. The ice bodies are placed over the aggregate in the mold by either controlled distribution (Fig. 6) or random distribution (Fig. 7) prior to the compression head **13** lowering down, and are subsequently compressed into the surface areas of the concrete block units after the compression head **13** has lowered into the mold (see Fig. 9).

The above process creates a conventional concrete clock in an extensive range of sizes dependant on the mold being used and it's configuration. The size, shape and hardness of the Ice bodies is critical to realize accurate representation of the Fossil Stone appearance, and it is extremely important to ensure consistent distribution of the ice bodies is realized without fusion, melting or fracture during the process. There are two means for distribution of the ice bodies onto the aggregate in the mold, one creating a "Controlled Distribution" and one creating a Random Distribution". The "Controlled Distribution" is realized by introduction of the ice bodies on a conveyor belt **20** the width of the mold **12**, and as the conveyor belt travels over the top of the mold, the ice bodies **21** fall off the front onto the mold. Following the retraction of the conveyor belt **20** is an ice rake **22** with a series of, for instance six inches (152.4 mm) long, wires **23**, for example one inch (25.4 mm) apart. The ice rake advantageously vibrates as it sweeps over the top of the mold and the ice bodies **21**, equally distributing the ice bodies over the mold.

The "Random Distribution" is realized from blowing the ice bodies **21** through a hose **24** with air as the means of forcing the ice bodies through the hose. The hose oscillates sideways back and forth until the desired amount of ice bodies are dispensed. There is no secondary means of leveling the ice bodies as the random application creates the desired result.

Alternatively, the ice body distribution can also be provided both in Consistent and Random Distributions by means of an auger **25**. The auger moves both horizontally and vertically over the mold **12** and augers the ice bodies onto the aggregate.

Once the ice bodies **21** are dispensed over the aggregate in the mold **12,** the compression head **13** is lowered forcing the ice bodies into the surface areas of the aggregate. Continuous vibration occurs during this phase, until the contact points (between compression head and mold) are reached defining the proper height on the concrete block units. At this point the vibration of the compression head and the mold ends and the concrete block units are discharged from the mold.

The newly manufactured concrete block units with ice bodies embedded in the surface areas are transported on a manufacturing pallet **16** to the curing chambers (not shown). During the curing process, the ice bodies **21** melt leaving voids **27** in the surface of the concrete block units the same shapes as the frozen ice bodies that were embedded in the product earlier.

After final cure, the concrete block units are removed from the curing chambers on the manufacturing pallets **16** to a work station (not shown) where the concrete block units are clamped and removed to a cube (not shown) that is wrapped and bound for inventory until delivery to the job-site.

Typical steps for an automated concrete block process would be:

a) Providing a steel mould of the desired concrete block outer shape;
b) Filling the mould with a pre-determined amount of soft aggregate mix;
c) Compressing the material in the mould to a desired height within the mould;
d) Introducing ice bodies onto a desired surface of the concrete material still in the mould;
e) Pressing the ice bodies down to a desired depth in the concrete surface;
f) Removing the pressed concrete block, which has sufficient green strength to keep its shape, the ice bodies are still pressed into the treated surface; and
g) Curing the pressed concrete block.

After introducing the ice bodies in step d) it is advantageous to level off the layer of deposited ice bodies, for example by using a swipe plate, finger plate or ice rake, prior to pressing the ice bodies down into the concrete surface.

Curing can be done either by leaving the block at ambient temperature for the desired period of time, or by treating it with steam and/or heat from other sources. The ice bodies will thus not melt until the curing starts.

Alternatively, the application of the ice bodies may be done before step c) so that the ice bodies will be pressed into the concrete surface during the compression of the material in the mould to a desired height within the mould. The method steps would then be:

a) Providing a steel mould of the desired concrete block outer shape;
b) Filling the mould with a pre-determined amount of soft aggregate mix;
c) Introducing ice bodies onto a desired surface of the concrete material still in the mould;
d) Compressing the material in the mould to a desired height within the mould and simultaneously pressing the ice bodies down to a desired depth in the concrete surface;
e) Removing the pressed concrete block, which has sufficient green strength to keep its shape, the ice bodies are still pressed into the treated surface; and
f) Curing the pressed concrete block.

When using a concrete slab, the method steps would be:

a) Providing a formed concrete slab of the desired shape;
b) Placing said slab in a holder or form, defining the slab form;
c) Introducing ice bodies onto a desired surface of said slab;
d) Pressing said ice bodies down to a desired depth in said surface;
e) Removing the holder after the initial cure of the slab, the ice bodies still being pressed into the treated surface; and
f) Final curing of the concrete slab.

Other materials are suitable to form the bodies, apart from ice. Thus, wax or similar material can be used, provided the material melts at low temperatures (for example temperatures close to room temperature, 20° C), but the ice bodies were superior to all tested materials. The ice

is cheap and very easy to repeatedly form into the desired shapes, and does not pollute the environment. Furthermore, no extra heating step, further to any heat curing of the concrete, is necessary when using ice. If wax is used, a separate step has to be performed, in which the temperature of the treated concrete block surface is raised above the melting temperature of the wax material.

According to a second embodiment of the invention, to form the desired impressions in the concrete surface, combustible formed bodies **21'** are pressed into the surface and left there when the block is moved to a curing facility. Preferable materials used for the combustible bodies are different types of wood or pressed and glued wood chips, paper, plastic, Styrofoam (reg. Trade mark), saw dust, leaves, cardboard, rubber and hemp etc. It is also envisioned to use any combination of bodies made of different material, as long as the body itself can be removed from the cured concrete block using heat. For example, ice bodies may be used in combination with combustible bodies. During curing, the ice bodies will melt, leaving the desired impression in the concrete surface. After curing, any combustible bodies will be heated to at least their combustion temperature, for example in a flame chamber **100** as shown in Figs. 12A to 12D, to burn away the combustible bodies and leave the indentations they formed visible in the concrete surface. Fig. 12B shows a concrete block before the combustible bodies **21'** have been burned away, and Fig. 12C shows the concrete block after the combustible bodies are burned away leaving voids **27'** in the concrete surface. The flame chamber houses at least one burner **110**, which directs a flame **120** towards the surface of the concrete block to be treated. The treated concrete surface may be on a horizontal or a vertical plane of the finished concrete block, in its application, as desired, or on more than one surface, for instance for corner applications. By controlling the sizes, shapes and quantity of the bodies applied to the concrete surface, it is possible to achieve a natural fossil stone look of the treated surface having a "random" dispersement of different size and shape indentations. The supply of appropriate formed ice bodies may be critical for an automated manufacturing plant, thus a fast-freezing mass production of ice bodies may be necessary. To achieve a natural looking artificial fossil stone, the body shape/size mix and quantity must be established.

The application of the bodies may again be manual or automatic, and is essentially performed in the same way as earlier described for ice bodies. Manual application can be anything from placing and pressing each body separately on and into the concrete surface, to spreading out

the body contents of a container onto the concrete surface and pressing all bodies down using a manual or automatic press. Automatic application is preferably performed similar to the last described manual application, but preferably using an automatic press only. For instance, concrete slabs coming from an automatic concrete extrusion machine may be held in a mould box, or equivalent structure, and have one or more surfaces treated automatically or manually as per above. Alternatively, concrete blocks cast individually may be manually or automatically treated with bodies whilst still in the mould.

Typical steps for an automated concrete block process would be:

a) Providing a steel mould of the desired concrete block outer shape;
b) Filling the mould with a pre-determined amount of soft aggregate mix;
c) Compressing the material in the mould to a desired height within the mould;
d) Introducing combustible bodies onto a desired surface of the concrete material still in the mould;
e) Pressing the combustible bodies down to a desired depth in the concrete surface;
f) Removing the pressed concrete block, which has sufficient green strength to keep its shape, the combustible bodies are still pressed into the treated surface;
g) Curing the pressed concrete block; and
h) Heating the combustible bodies to their combustion temperature, to burn away the combustible bodies from the cured and pressed concrete block.

After introducing the bodies in step d) it is advantageous to level off the layer of deposited combustible bodies, for example by using a swipe plate, finger plate or ice rake, prior to pressing the bodies down into the concrete surface.

Curing can be done either by leaving the block at ambient temperature for the desired period of time, or by treating it with steam and/or heat from other sources. Any ice bodies will thus not melt until the curing starts.

Alternatively, the application of the combustible bodies may be done before step c) so that the combustible bodies will be pressed into the concrete surface during the compression of the material in the mould to a desired height within the mould. The method steps would then be:

a) Providing a steel mould of the desired concrete block outer shape;

b) Filling the mould with a pre-determined amount of soft aggregate mix;

c) Introducing combustible bodies onto a desired surface of the concrete material still in the mould;

d) Compressing the material in the mould to a desired height within the mould and simultaneously pressing the combustible bodies down to a desired depth in the concrete surface;

e) Removing the pressed concrete block, which has sufficient green strength to keep its shape, the combustible bodies are still pressed into the treated surface;

f) Curing the pressed concrete block; and

g) Heating the combustible bodies to their combustion temperature, to burn away the combustible bodies from the cured and pressed concrete block.

When using a concrete slab, the method steps would be:

a) Providing a formed concrete slab of the desired shape;

b) Placing the slab in a holder or form;

c) Introducing combustible bodies onto a desired surface of the slab;

d) Pressing the combustible bodies down to a desired depth in the surface;

e) Removing the holder after the initial cure of the cement slab, the combustible bodies still being pressed into the treated surface;

f) Final curing of the concrete block; and

g) Heating the combustible bodies to their combustion temperature, to burn away the combustible bodies from the cured and pressed concrete slab.

It will be appreciated that the above description relates to the preferred embodiments by way of example only. Many variations on the invention will be obvious to those knowledgeable in the field, and such obvious variations are within the scope of the invention as described and claimed whether or not expressly described. For instance, it has been mentioned that a mixture of meltable and combustible bodies can be used. The meltable bodies would then melt during the combustion of the combustible bodies. A reason for mixing different material bodies is that some shapes are easier to make using a certain material, or can be found in nature already formed, and other shapes are cheapest and easiest formed using ice as mentioned earlier.

It should also be understood that the invention is not restricted to the specific concrete mix mentioned above, the process being adaptable to almost any typical mix design for manufactured products, nor are the preferred additives essential, although they are desirable.

INDUSTRIAL APPLICABILITY

The invention provides a method of producing artificial stone, such as concrete blocks, having a surface with randomly dispersed holes making the artificial stone look like a natural fossil rock to be used for building purposes.

CLAIMS:

1. A method of producing surface textured concrete blocks, comprising the steps of:

a) Providing an un-cured concrete block of a pre-determined outer shape;

b) Introducing formed bodies onto a desired surface of said concrete block;

c) Pressing said formed bodies down to a desired depth in said surface;

d) Removing the pressed concrete block, which has sufficient green strength to keep its shape, said formed bodies still pressed into said surface; and

e) At least partly curing said pressed concrete block;

f) Removing said formed bodies.

2. The method as recited in claim 1, further comprising the step of leveling off the layer of deposited ice bodies, by raking the ice bodies, after introducing the formed bodies in step b) and prior to step c).

3. The method as recited in claim 1, where said formed bodies are manufactured from a meltable material and step f) comprises heating said at least partly cured concrete block to a temperature at which said formed bodies melt and are removed from said concrete block.

4. The method as recited in claim 3, where the material of said formed bodies is chosen from any of the group comprising ice and wax.

5. The method as recited in claim 1, where said formed bodies are manufactured from a combustible material and step f) comprises heating said at least partly cured concrete block to a temperature at which said formed bodies combust and are removed from said concrete block.

6. The method as recited in claim 5, where the material of said formed bodies is chosen from any of the group comprising wood, saw dust, leaves, cardboard, paper, rubber, plastic and hemp.

7. The method as recited in claim 1, where step a) comprises providing a mould of the desired concrete block outer shape and filling said mould with a pre-determined amount of soft aggregate material mix.

8. The method as recited in claim 7, further comprising the step of compressing said material in said mould to a desired height within said mould after step a) and before step b).

9. The method as recited in claim 7, where step c) further comprises compressing said material in said mould to a desired height within said mould.

10. The method as recited in claim 1, where step a) comprises providing an extruded concrete block of the desired shape and placing said concrete block in a holder.

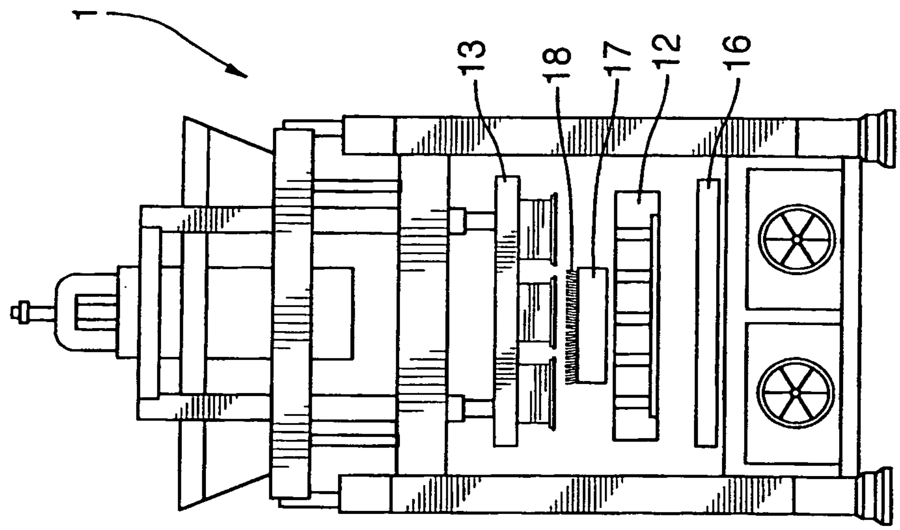

FIG.1B

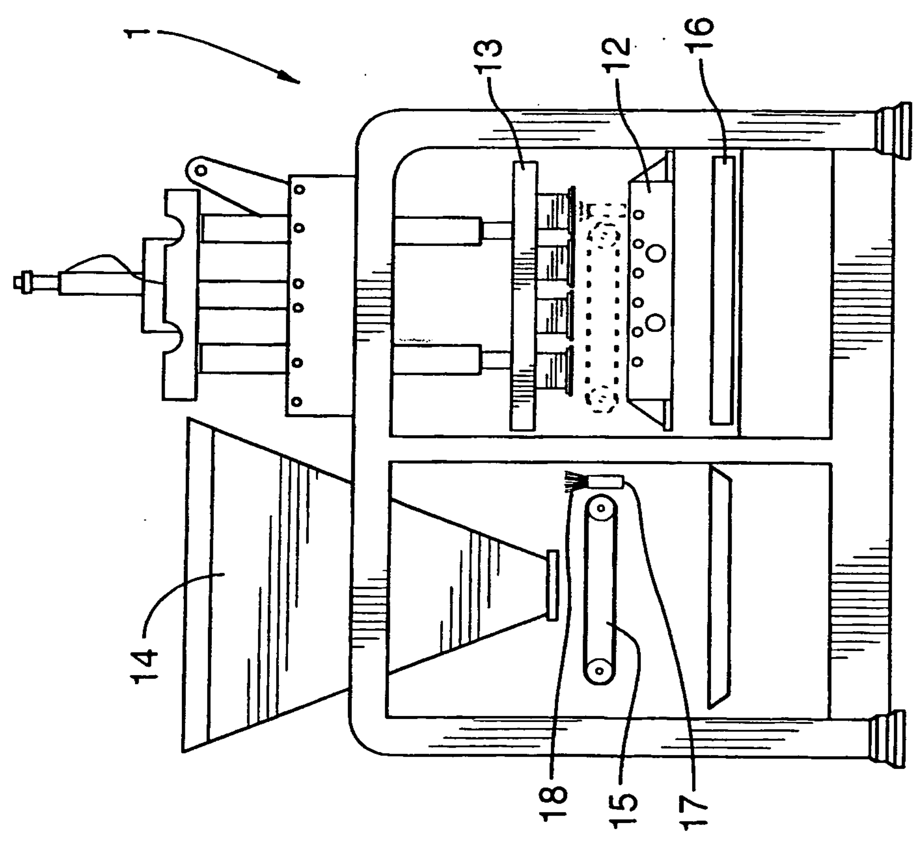

FIG.1A

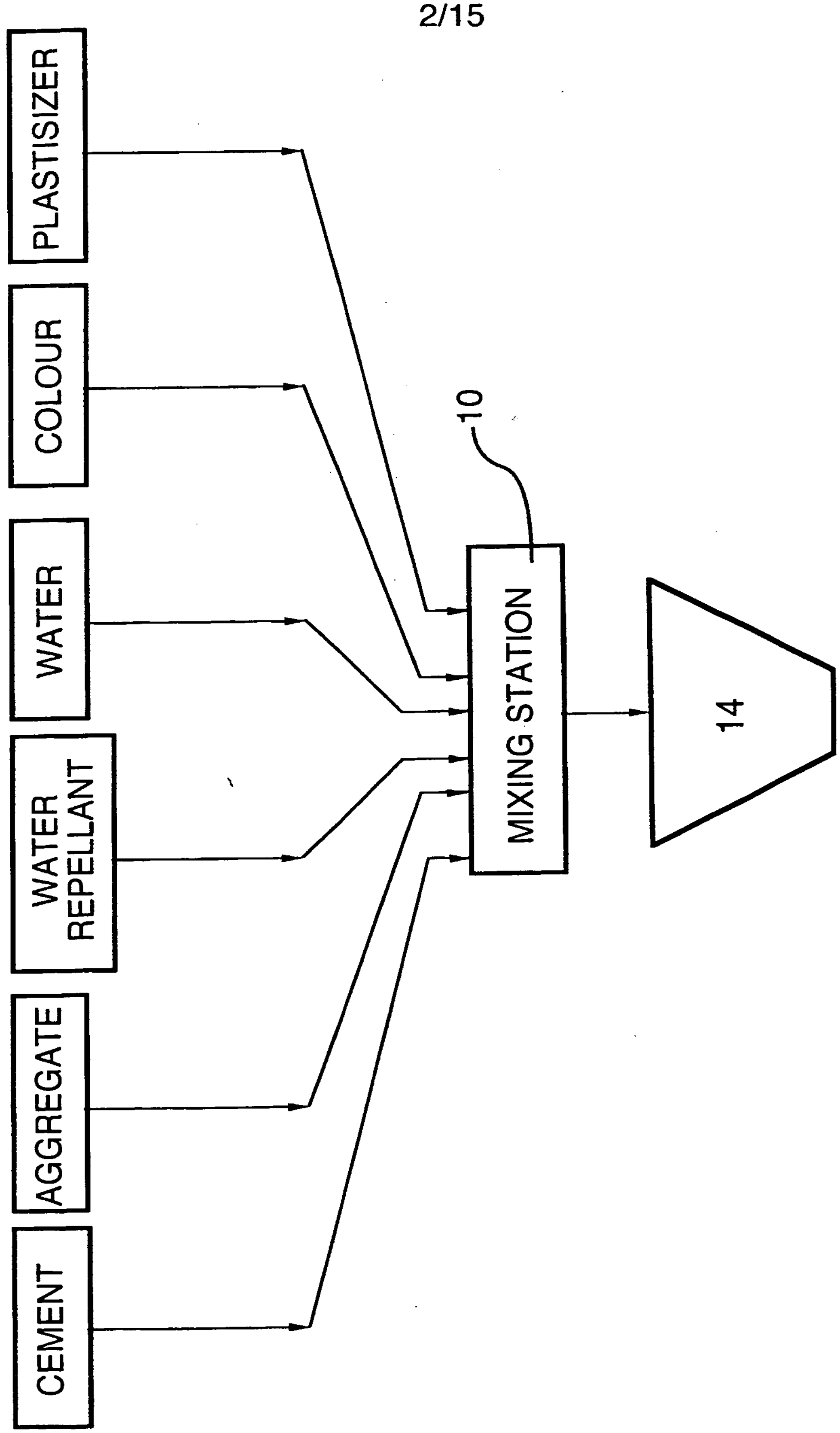
PLASTISIZER
COLOUR
WATER
WATER REPELLANT
AGGREGATE
CEMENT
MIXING STATION
10
14

FIG.1C

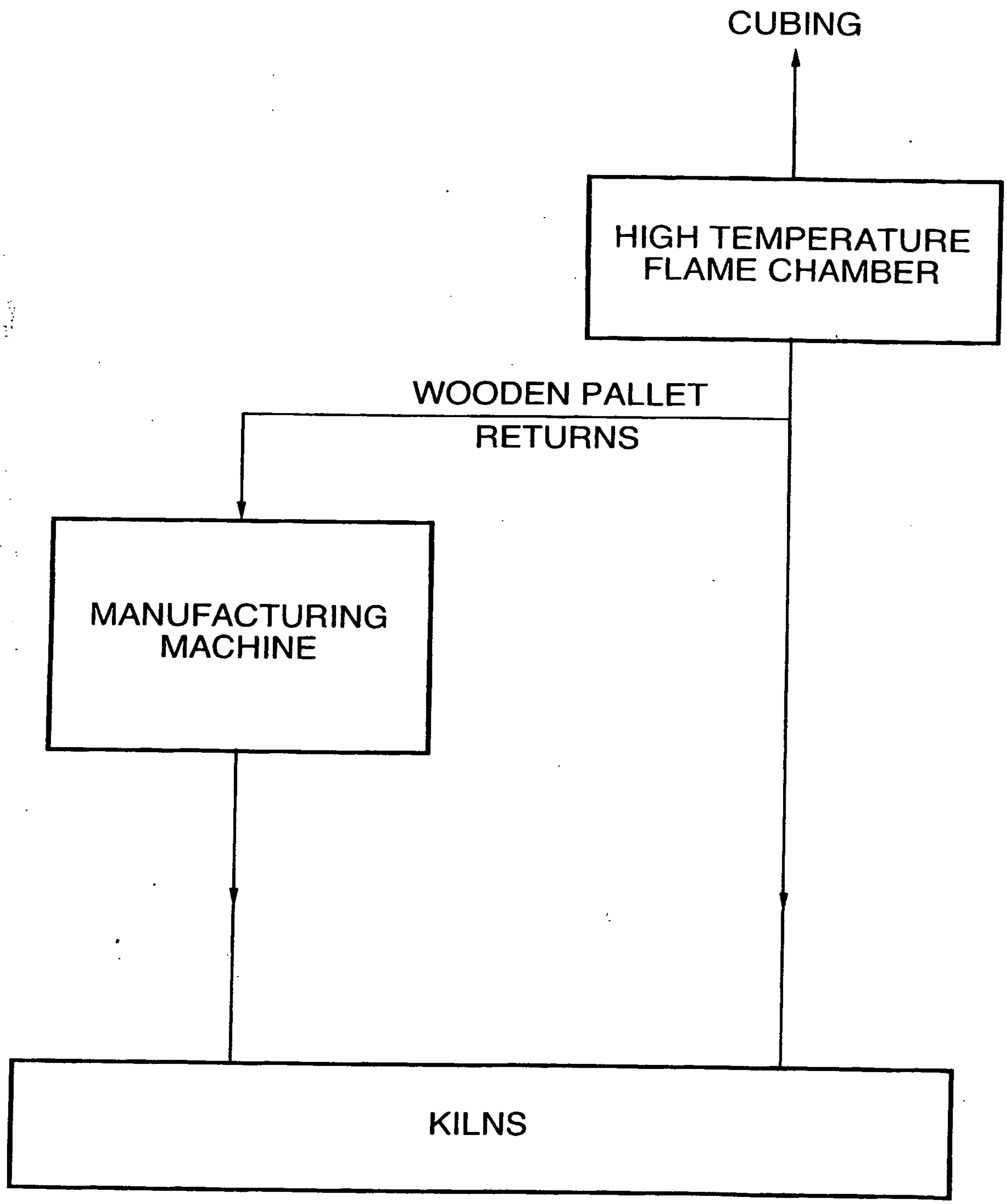
CUBING
HIGH TEMPERATURE FLAME CHAMBER
WOODEN PALLET RETURNS
MANUFACTURING MACHINE
KILNS

FIG.1D

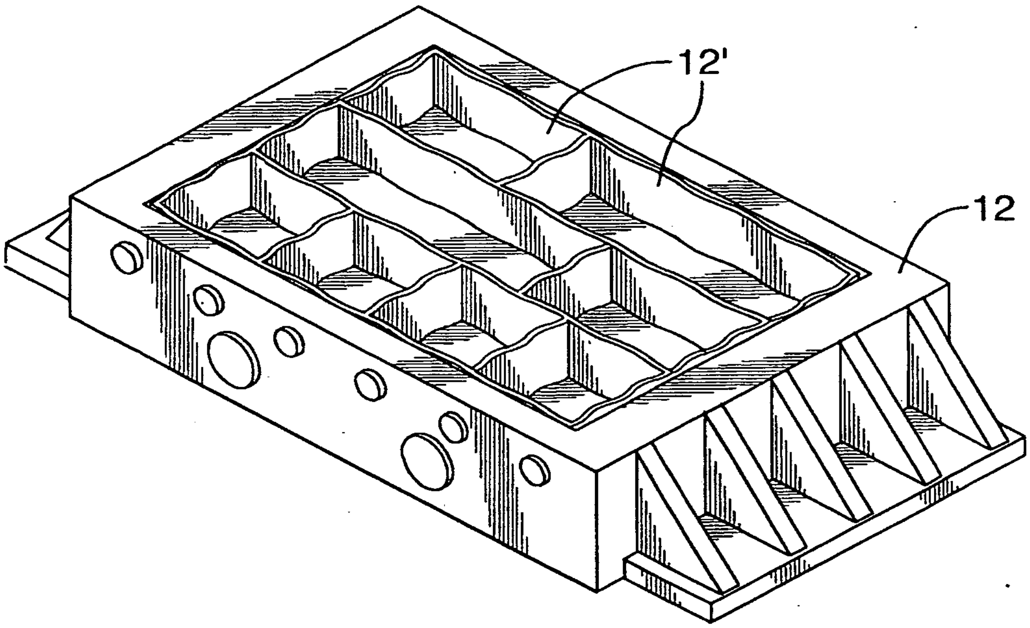

FIG.2

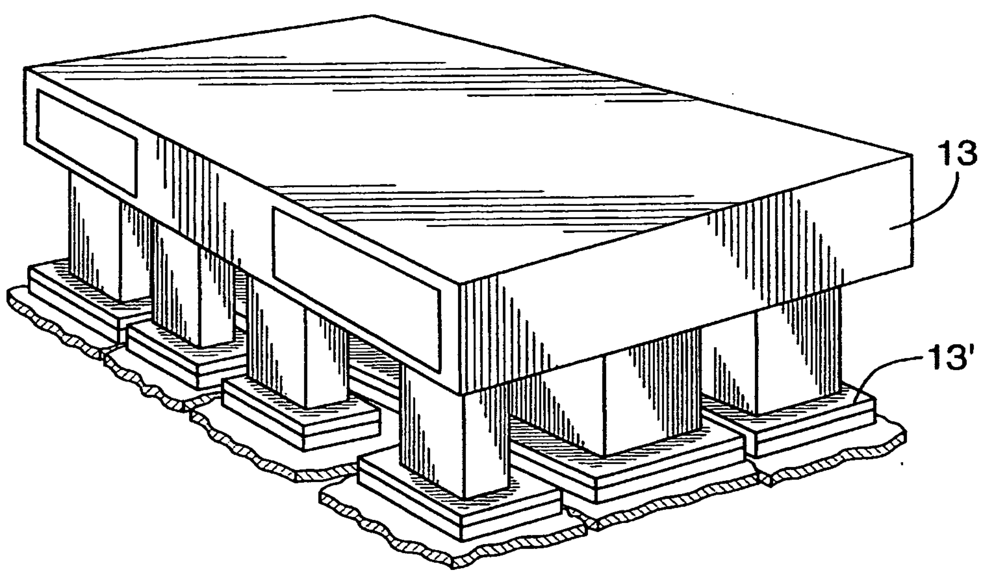

FIG.3

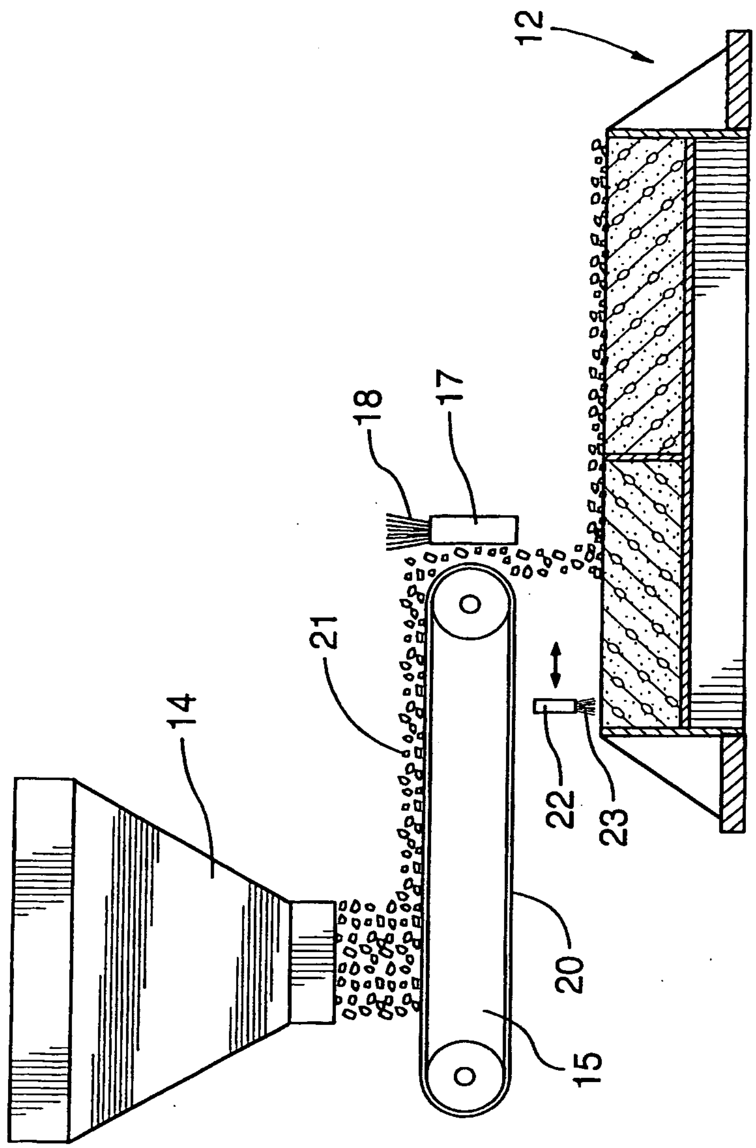

FIG.4

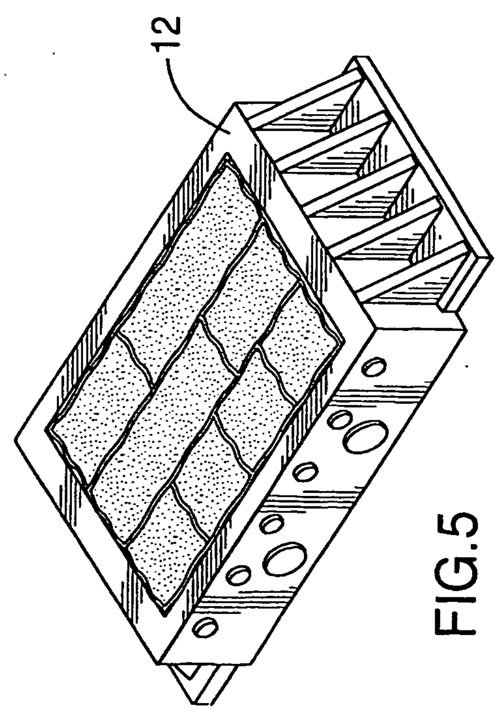

FIG.5

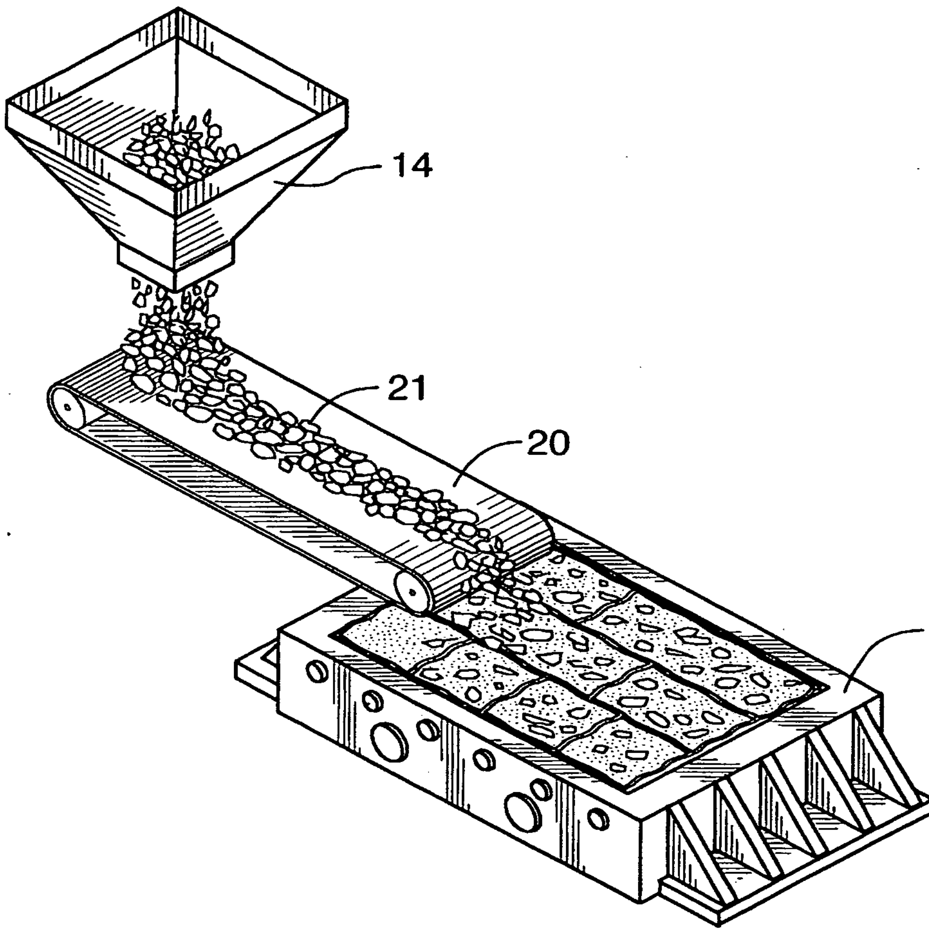

FIG.6

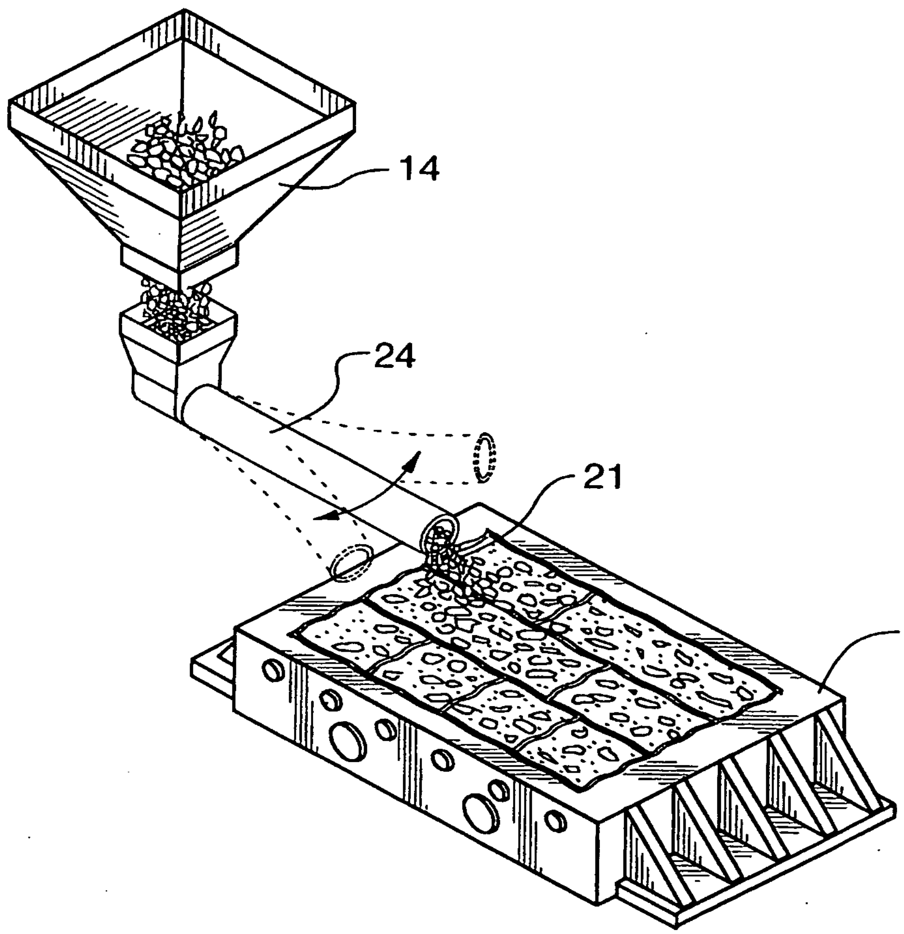

FIG.7A

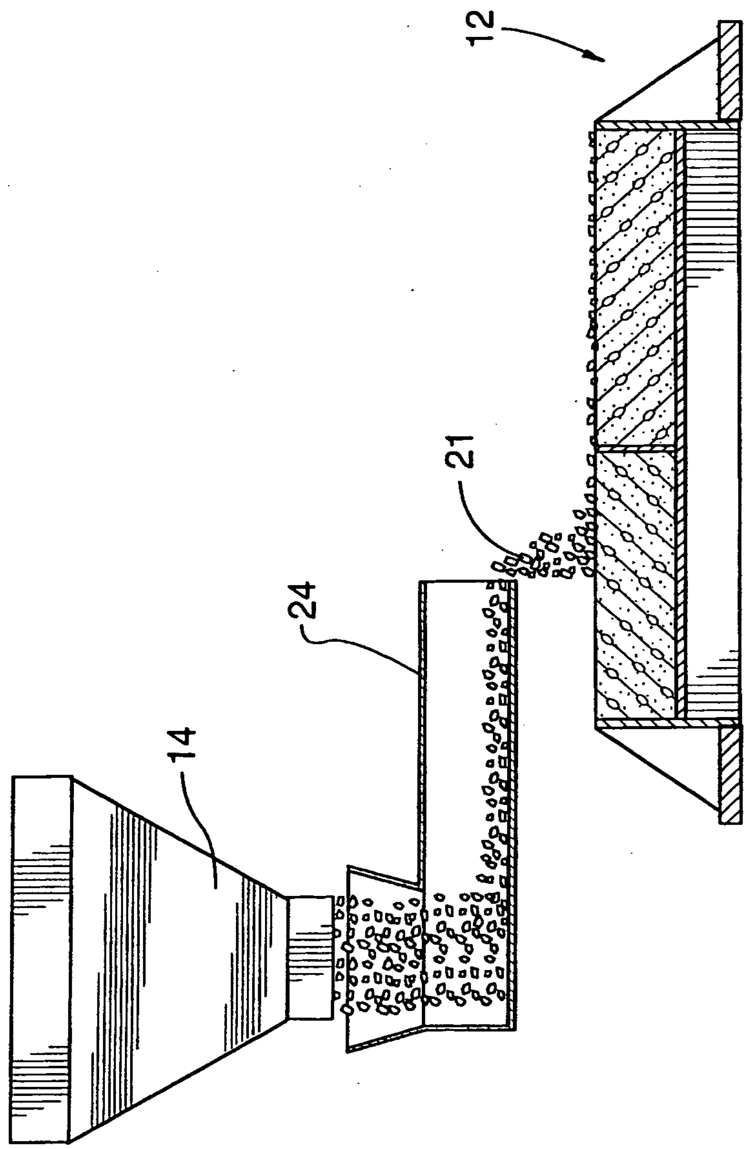

FIG.7B

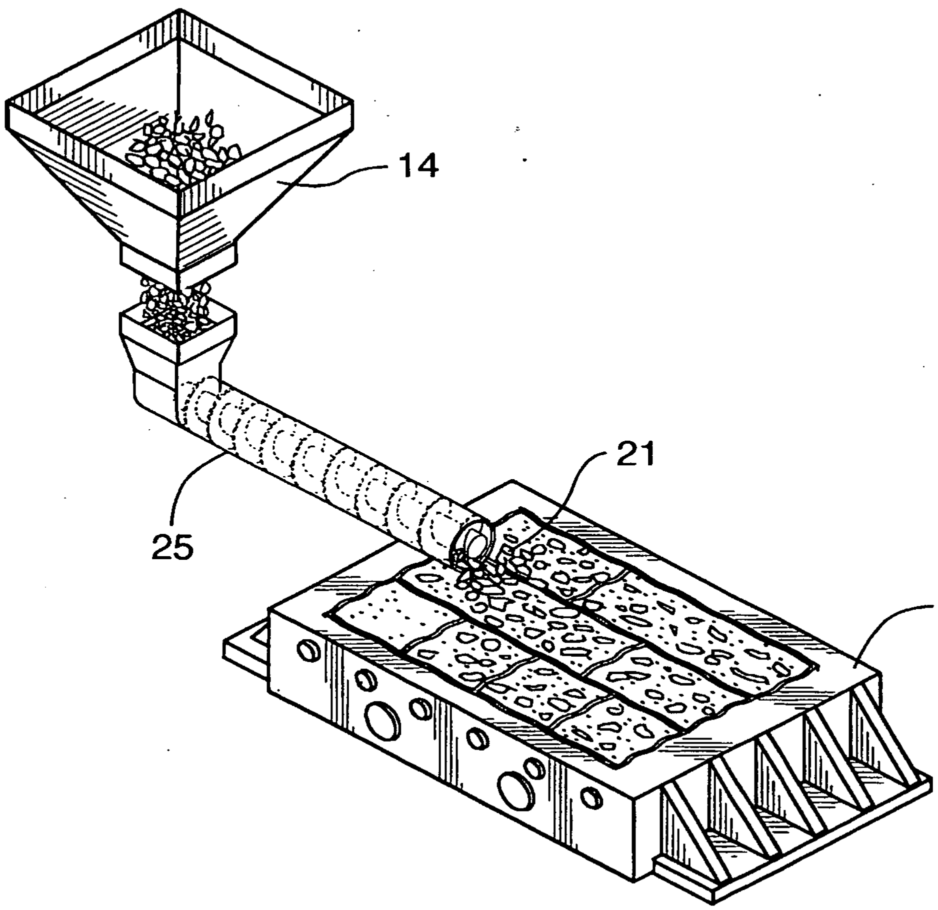

FIG.8A

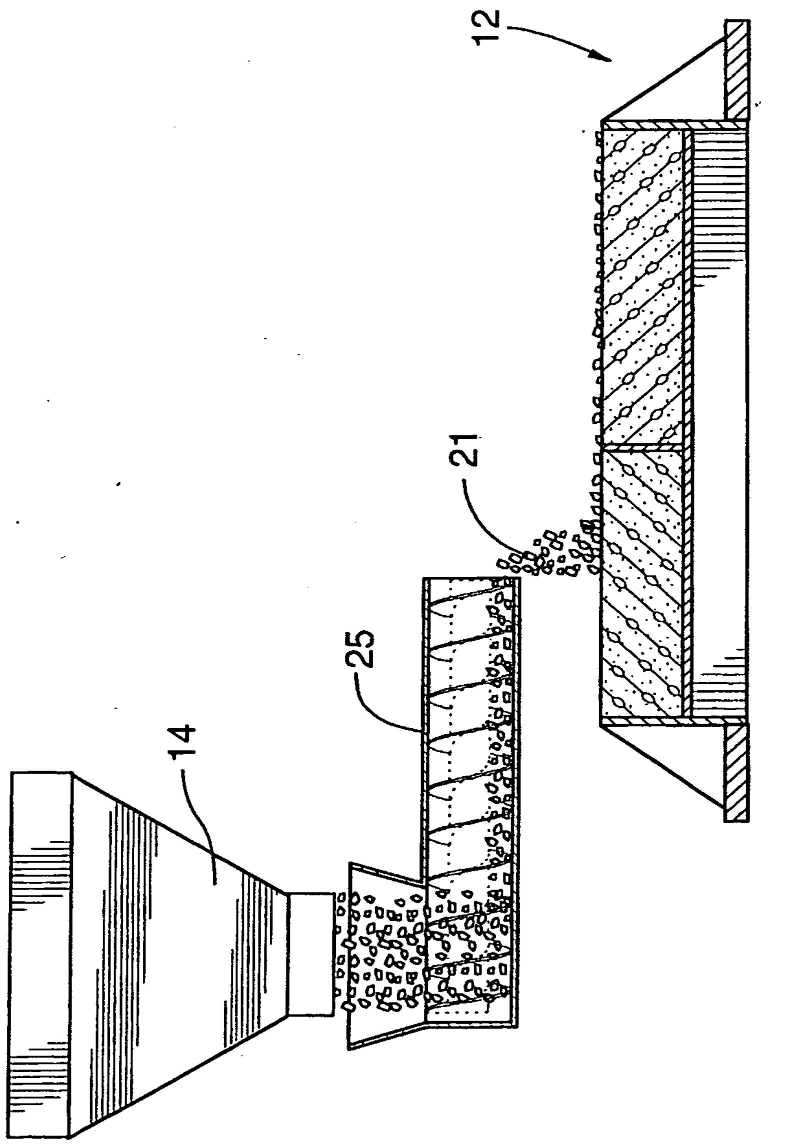

FIG.8B

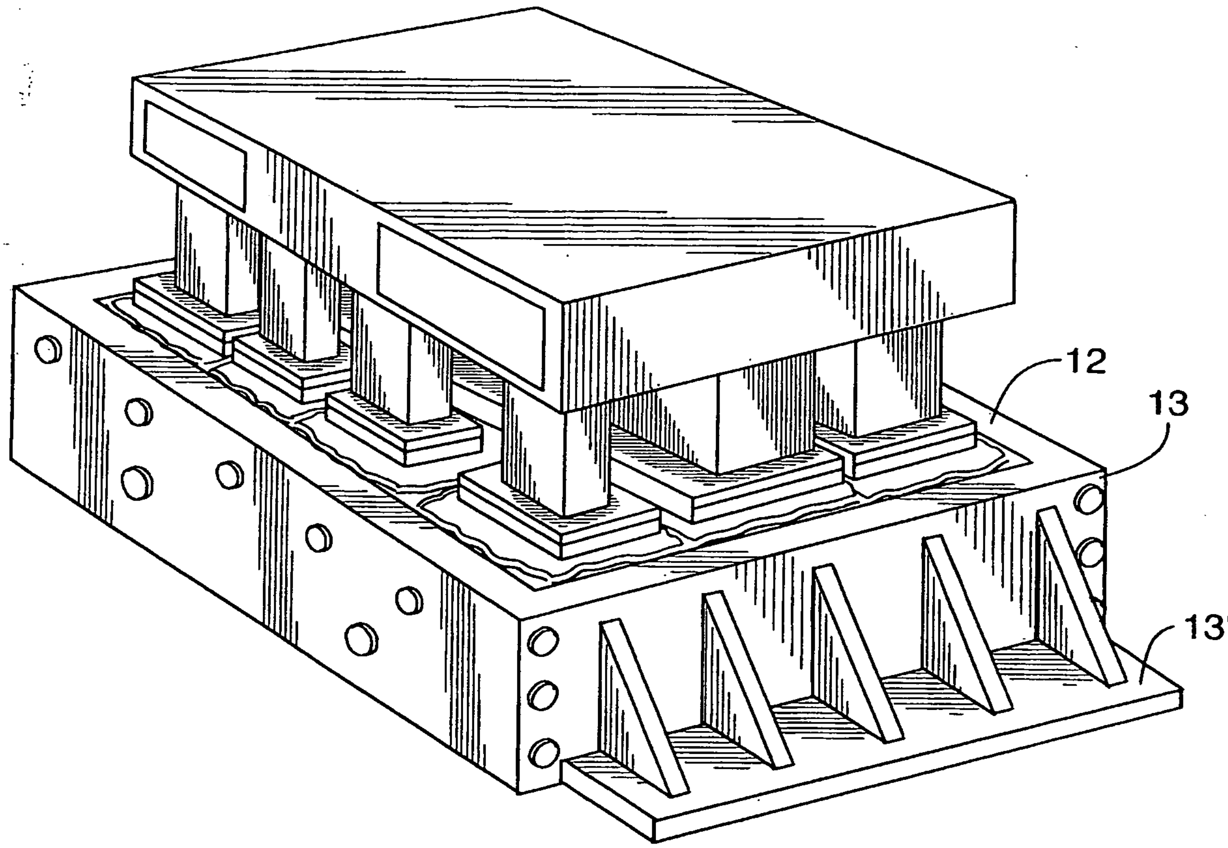

FIG.9

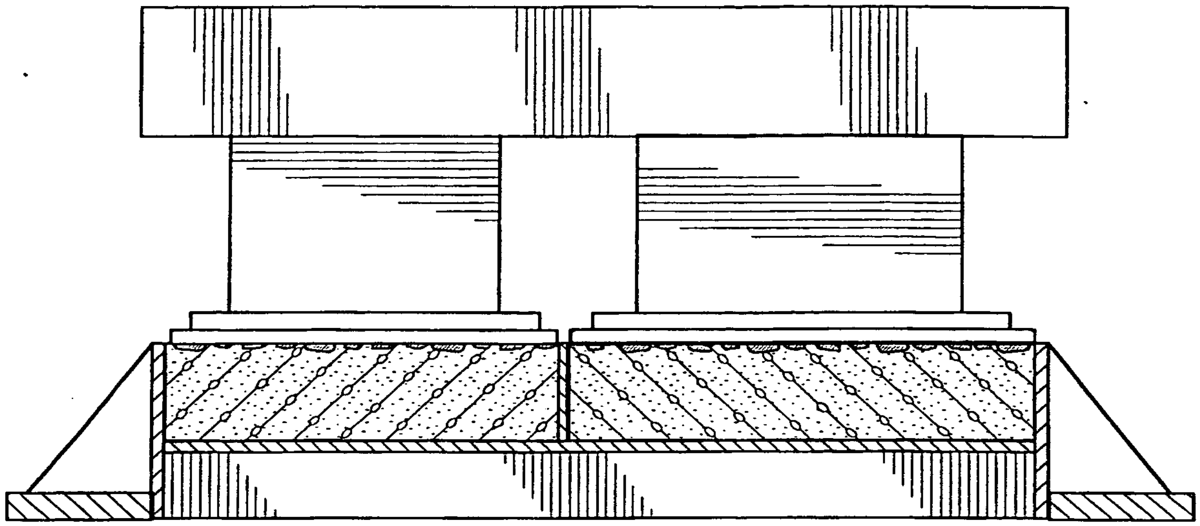

FIG.10A

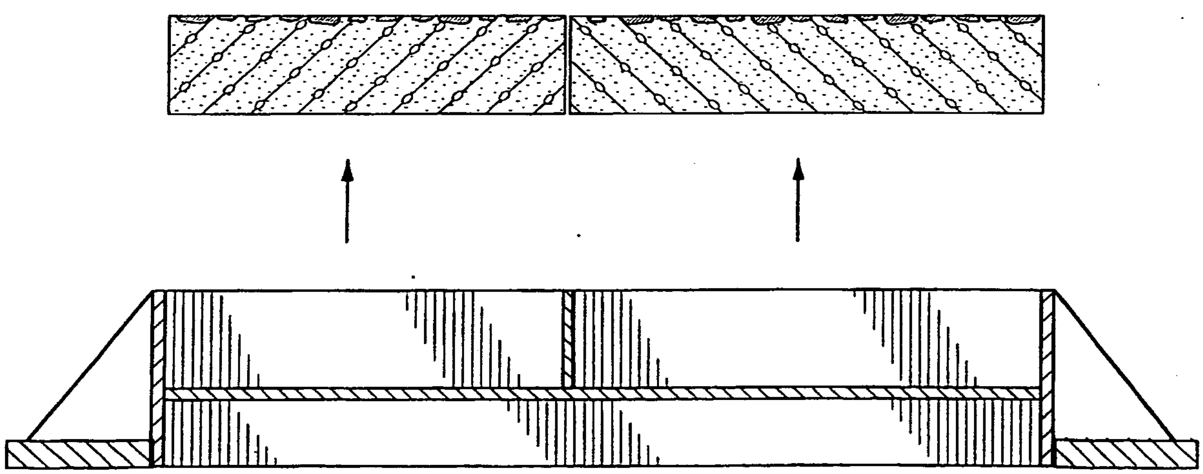

FIG.10B

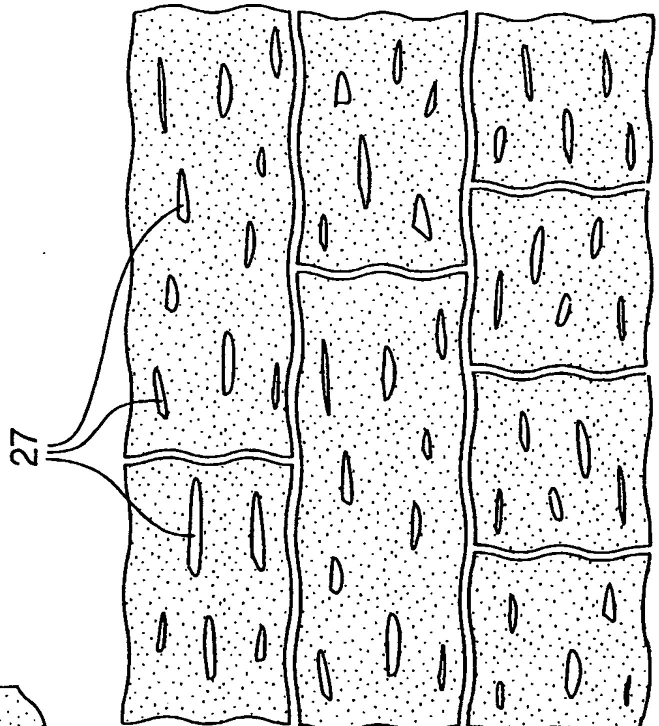

FIG.11B

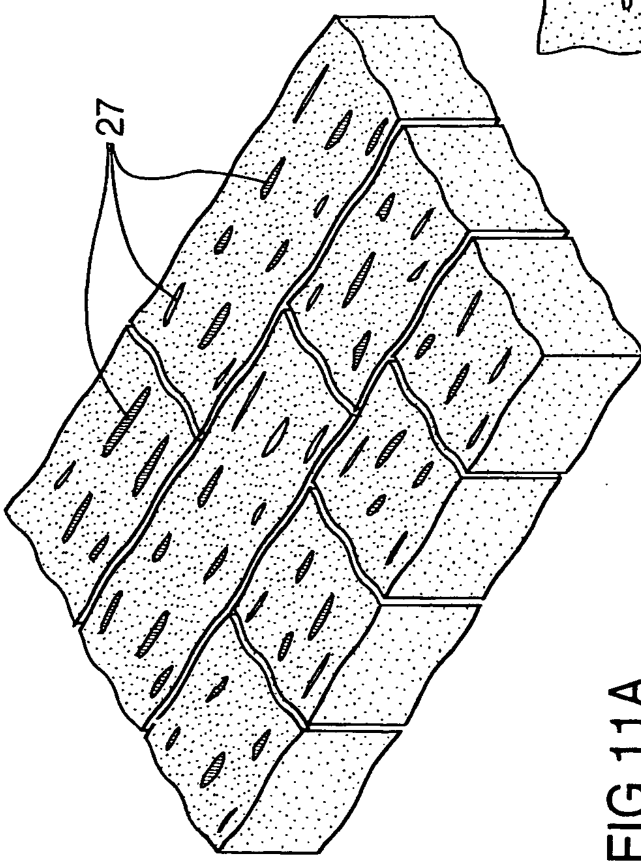

FIG.11A

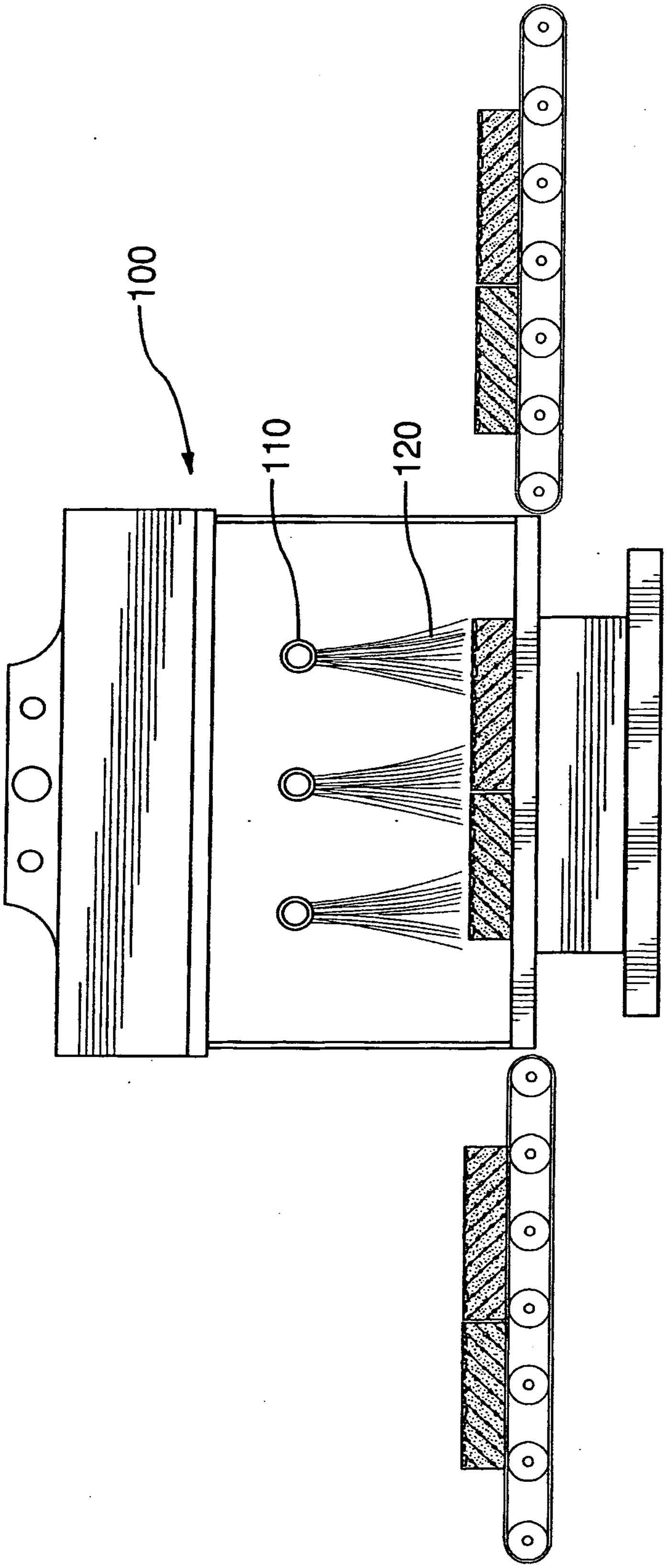

FIG.12A

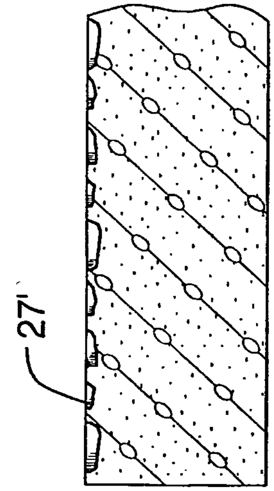

FIG.12C

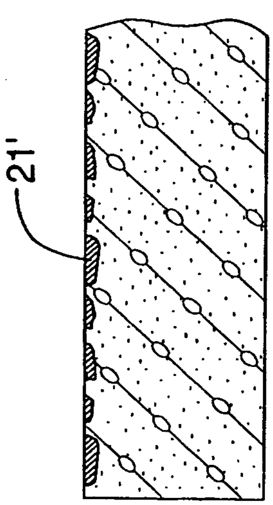

FIG.12B

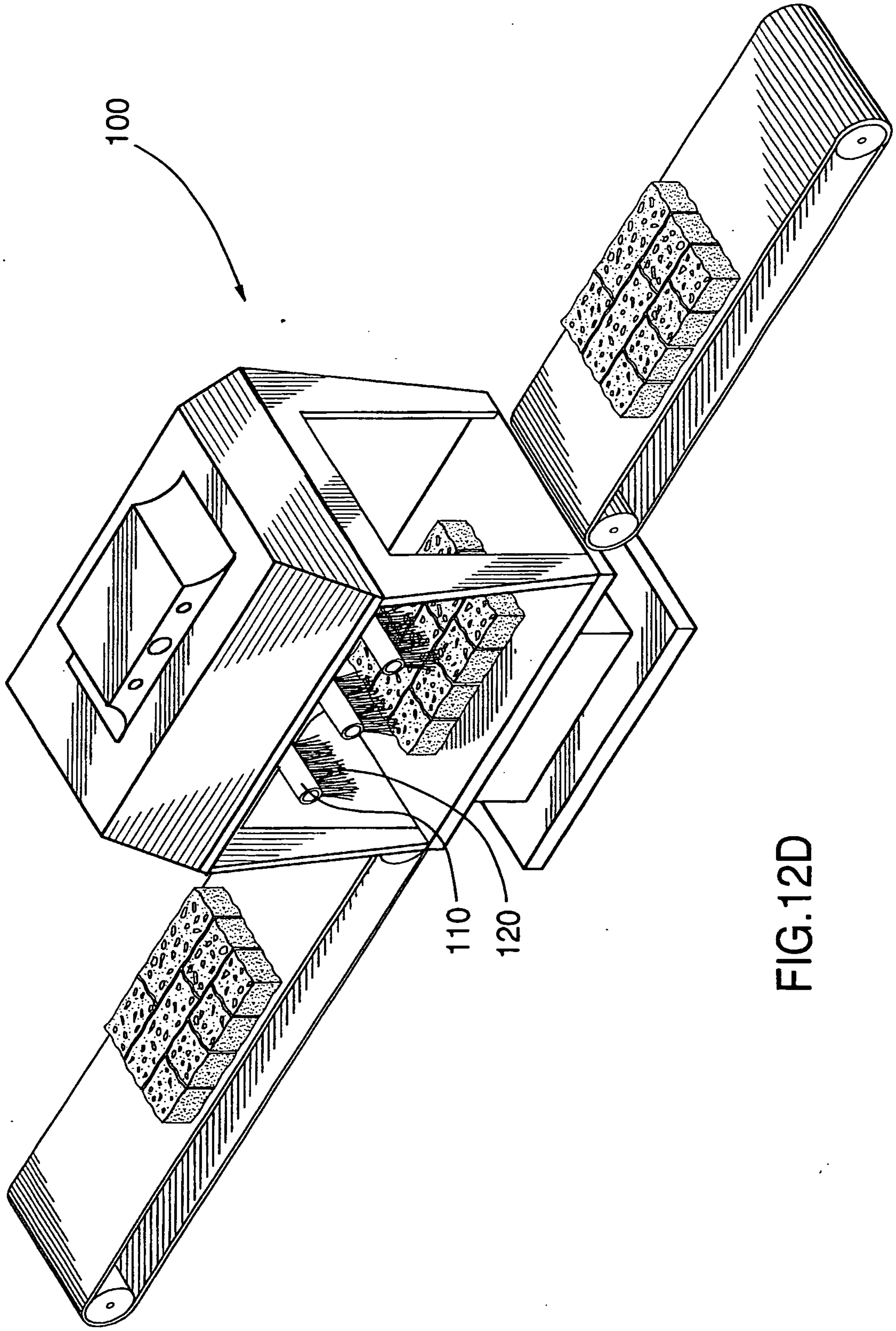

FIG.12D

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(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: **SHOULLDICE, Robert, B.** [CA/CA]; P.O. Box 88, Shallow Lake, Ontario N0H 2K0 (CA).

(74) Agent: **ARMSTRONG, R., Craig**; Borden Ladner Gervais LLP, World Exchange Plaza, 1100-100 Queen Street, Ottawa, Ontario K1P 5J9 (CA).

(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW.

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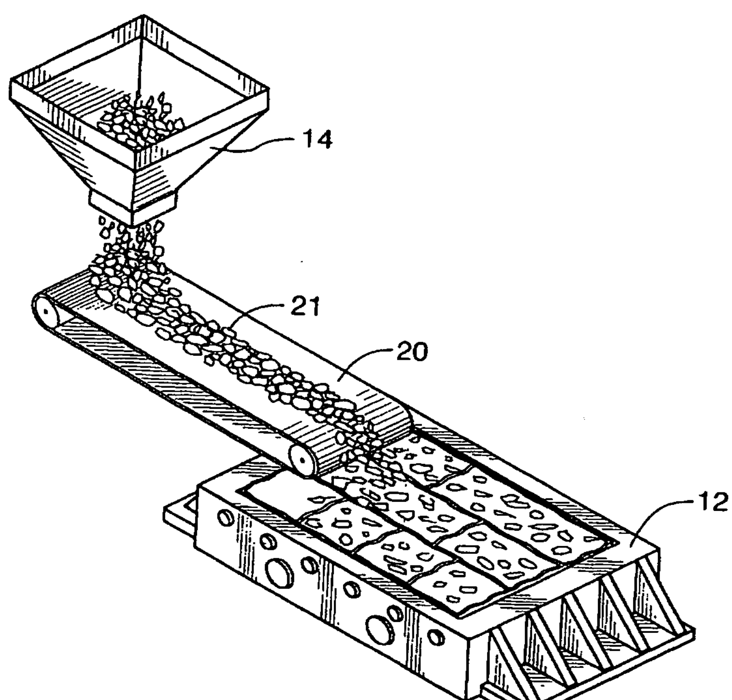
Published:
— *with international search report*

[Continued on next page]

(54) Title: METHOD FOR CREATING CONCRETE BLOCKS WITH THE APPEARANCE OF NATURAL FOSSIL STONE



(57) Abstract: A generally conventional concrete block is cast using known procedures. After pouring concrete in a mould, or otherwise forming a block, and before the surface of the concrete has set, shaped bodies of ice are randomly placed on the surface or surfaces to be treated and pressed into the surface(s) to desired depths. The ice bodies will melt during curing of the concrete, but not before the concrete has set enough to keep the shape of the indentations made by the ice bodies. Thus, when the concrete block has set completely, there remains a textured surface having a structure similar to that of natural fossil stone. Alternatively, shaped bodies of combustible material are randomly placed on the surface or surfaces to be treated and pressed into the surface(s) to desired depths. The combustible bodies will make the concrete keep the shape of the indentations made by the bodies after the concrete has cured. After curing, the combustible bodies are heated to their combustion temperature and burned away from the concrete surface. Thus, when the bodies have been removed, there remains a textured surface having a structure similar to that of natural fossil stone.

WO 02/070217 A3

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

(88) Date of publication of the international search report: 28 November 2002

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/CA 02/00264

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B28B11/10 B28B7/34

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B28B B44C B44F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X	PATENT ABSTRACTS OF JAPAN vol. 015, no. 5748 (M-1498), 19 October 1993 (1993-10-19) & JP 05 169422 A (KUBOTA CORP), 9 July 1993 (1993-07-09) abstract	1,3,7,10
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X	GB 2 290 497 A (LONDON BRICK CO) 3 January 1996 (1996-01-03) page 3, line 1 - line 15 abstract; figures 1-3	1,5-7,10

Y	US 5 356 579 A (JENNINGS HAMLIN M ET AL) 18 October 1994 (1994-10-18) column 2, line 25 - line 48 abstract	4

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[X] Further documents are listed in the continuation of box C.

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Date of the actual completion of the international search	Date of mailing of the international search report
6 September 2002	25.09.02

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Jörgen Klöfver / MRo

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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06/07/02

International application No.
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